REMARKS:

The Examiner's indication of allowability with respect to claims 22-28 is gratefully acknowledged.

Reconsideration of the Examiner's rejection of claims 1-5, 13-18, 21 and 29 under 35 U.S.C. 102(b) as being anticipated by Sahbari (U.S. 2002/0013239) is respectfully requested.

In order to anticipate a claimed invention, a cited reference must teach or disclose each and every element of the claimed invention. In the present case, Sahbari does not anticipate the recited claims, because Sahbari does not teach or disclose the claimed element of a micellar solution.

The Examiner points to paragraph [0028] of Sahbari as teaching the use of a micellar solution. However, while paragraph [0028] discusses surfactants (from which micellar solutions are formed), neither paragraph [0028], nor any other part of Sahbari, explicitly mentions micellar solutions. Hence, the Examiner is necessarily relying on an inherency argument in postulating that the surfactant solutions of Sahbari are micellar solutions.

However, the Examiner is respectfully reminded that, in order to establish inherency, it is insufficient to show that the surfactant solutions of Sahbari can, or might, be micellar solutions. Rather, the Examiner must demonstrate that the surfactant solutions of Sahbari must necessarily be micellar solutions. Here, the Examiner is referred to M.P.E.P. § 2112(IV), which states that:

> The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. ... "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'

In the present case, although the property of being a micellar solution is a property that might possibly be possessed by a surfactant solution, it is not a property that is necessarily

possessed by a surfactant solution. In other words, while all micellar solutions are surfactant solutions, not all surfactant solutions are micellar solutions.[1]

To the contrary, as discussed in Paragraph [0016] of the present application, whether or not a surfactant solution is a micellar solution (that is, whether or not the surfactant solution forms micelles) depends, among other things, on the concentration, pH, temperature, water content, and electrolyte composition of the surfactant solution. Any one of these variables, or any combination of these variables, could conspire to prevent the surfactant solution from forming a micellar solution. Hence, even if the Examiner were able to demonstrate, for example, that a surfactant solution disclosed in Sahbari is formed from the same surfactant (or combination of surfactants) present in one of the micellar solutions of the present application, and even if the Examiner could demonstrate that the concentration of that surfactant (or combination of surfactants) exceeds the critical micelle concentration (CMC), it would still not follow that the Sahbari solution is inherently a micellar solution, because the pH, temperature, water content, and/or electrolyte composition of the surfactant solution could prevent it from forming micelles.

With respect to claim 5, the Examiner acknowledges that Sahbari does not explicitly disclose the application of the treatments described therein to a semiconductor device having a bulk dielectric constant K which is below 3.0. However, the Examiner notes that Sahbari teaches that the solutions disclosed therein are compatible with a wide range of dielectric materials, including silsesquioxane (HSQ), and that Aoki teaches that HSQ has a dielectric constant of 2.8. From this, the Examiner concludes that, since the chemical structure of the dielectric material (HSQ) disclosed in Aoki is identical to the chemical structure of a dielectric material (also HSQ) disclosed in Sahbari, the later material inherently has a dielectric constant of 2.8, thereby anticipating claim 5. Applicant respectfully disagrees.

As a preliminary matter, Applicant notes that HSQ is not a single compound with a single chemical structure and a single composition, but is a class of polymers having various structures and compositions. For example, HSQ can have a ladder structure or a cage structure (see, e.g., Pages 9-10 of M. Clark, "Introducing Low-k Dielectrics into Semiconductor Processing" (June 11, 2001, printed by Millipore Corporation), set forth herein as EXHIBIT A), and the structure of

[1] Here, the Examiner is respectfully reminded that a species does not anticipate a genus.

the material affects its dielectric properties. Indeed, Table 2 on Page 5 of the reference shows that the dielectric constant of HSQ applied by spin-on processes (a common method of application in the semiconductor arts) can range from 2.9 to 3.2. The Clark reference also notes that the actual dielectric properties of HSQ may be significantly affected by the processing parameters that the HSQ is exposed to. Thus, the reference notes at Page 9 that, when HSQ is exposed to processing temperatures above 400°C (also common in semiconductor processing), its dielectric constant increases to near that of SiO_2 ($k = 3.9$ to 4.5). The porosity of HSQ is also known to have a significant effect on its dielectric properties.

In light of the foregoing, the Examiner will appreciate that the mere recitation in Sahbari of HSQ, coupled with the recitation in Aoki that HSQ can have a dielectric constant of 2.8, is insufficient to establish that the HSQ referred to in Sahbari inherently has a dielectric constant of less than 3.0, as the Examiner would be required to establish in order to show that claim 5 is anticipated by Sahbari. In particular, as previously shown, a recitation of HSQ could refer to a material having a dielectric constant near that of that of SiO_2 ($k = 3.9$ to 4.5), depending on its heat treatment profile. Since the dielectric constant range recited in claim 5 is not inherent in Sahbari, claim 5 is not anticipated by that reference.

Reconsideration of the Examiner's rejection of claims 6, 8-9, 12 and 19 under 35 U.S.C. 103(a) as being unpatentable over Sahbari (U.S. 2002/0013239) in view of Aoki (U.S. 6,423,148) is respectfully requested.

The infirmities of Sahbari have been noted above. These infirmities are not cured by Aoki. In particular, Aoki contains no teaching or description of micellar solutions, nor is there any suggestion in either of the cited references of the advantages attendant to the use of a micellar solution. Rather, at most these references could be taken to suggest the use of surfactant in the solutions described therein. However, surfactants are typically used to reduce surface tension in a solution, and do not have to be present at the critical micelle concentration to serve this function.

Reconsideration of the Examiner's rejection of claims 7 and 10 under 35 U.S.C. 103(a) as being unpatentable over Sahbari (U.S. 2002/0013239) in view of DeYoung (U.S. 6,641,678) is respectfully requested.

The infirmities of Sahbari have been noted above. These infirmities are not cured by DeYoung. In particular, DeYoung contains no teaching or description of micellar solutions, nor is there any suggestion in either of the cited references of the advantages attendant to the use of a micellar solution. Rather, at most these references could be taken to suggest the use of surfactant in the solutions described therein. However, surfactants are typically used to reduce surface tension in a solution, and do not have to be present at the critical micelle concentration to serve this function.

Reconsideration of the Examiner's rejection of claim 11 under 35 U.S.C. 103(a) as being unpatentable over Sahbari (U.S. 2002/0013239) in view of Besso et al. (U.S. 6,440,856) is respectfully requested.

The infirmities of Sahbari have been noted above. These infirmities are not cured by Besso. In particular, Besso contains no teaching or description of micellar solutions, nor is there any suggestion in either of the cited references of the advantages attendant to the use of a micellar solution. Rather, at most these references could be taken to suggest the use of surfactant in the solutions described therein. However, surfactants are typically used to reduce surface tension in a solution, and do not have to be present at the critical micelle concentration to serve this function.

The Commissioner is hereby authorized to charge any fees due with this response, including those noted in the cover sheet, to the deposit account of FORTKORT GRETHER + KELTON LLP, Deposit Account No. 50-2726.

Respectfully submitted,

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